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Federal Aviation Administration
R&D Review

Building a safe, secure, efficient, and environmentally compatible aviation system

FAA Tests NewEMAS Prototype

The FAA, Port Authority of New York and New Jersey, and Engineered Systems Company (ESCO) of Ashton, PA, researchers are currently testing a second-generation engineered material arresting system (EMAS) that will increase airport runway safety, protecting people and aircraft during overrun accidents.

For those approximately 350 airport locations in the United States that do not have the space for a full runway safety area, EMAS, made of water, foam, and cement, may provide an engineered solution to create a margin of safety. EMAS deforms readily and reliably under the weight of an aircraft tire. As the tires crush the material, the drag forces decelerate the aircraft, bringing it to a safe stop.

EMAS is proven technology that has saved lives. On May 8, 1999, this key product of the FAA R&D program paid a huge safety dividend.

On that day, an American Eagle flight ran out of runway while trying to land at John F. Kennedy International Airport (JFK). The Saab 340 commuter aircraft overshot the runway, stopping 248 feet into the 400-foot long arrestor bed, only 200 feet from the waters of Thurston Bay. All 30 onboard walked off the aircraft. Damage to the aircraft was minimal; damage to the bed was restricted to a 30-foot wide and 250-foot long section.

Although the prototype has proven to be a critical safety enhancement for airports that do not have space for a full 1,000-foot safety area at the end of the runway, researchers discovered that over time the arrestor material deteriorated when exposed to jet blast. To solve this problem, the FAA worked with industry to redesign the system, making it more resistant to jet blast, wind, noise, acoustics, and temperature.

This second generation prototype recently underwent extensive jet blast testing at the FAA's William J. Hughes Technical Center in Atlantic City, NJ. Re-searchers mapped the various components of jet blast forces on the runway 22 overrun safety area at New York's LaGaurdia airport, where conditions are perhaps the most severe imaginable. They then set up the test at the FAA wind tunnel facility, where they ran a series of tests equivalent to a full year of jet blast from runway 4 departures at LaGuardia. The cellular cement blocks and new topcoat survived this exposure with absolutely no damage. As a result of the wind tunnel tests, a demonstration bed was installed 75 feet from the departure end of runway 4 at LGA. After 16 months of jet blast exposure the demo bed is in excellent condition.

To provide further assurance of durability, this Fall the Port Authority plans to install a second demonstration bed on the LaGuardia runway 22 overrun safety area. This installation will use a 35foot setback, rather than the typical 100 feet or more. Over the next year, the bed will be extended gradually to full length, 275 feet, and will convert to a fully functional bed next summer. This will culminate a two-year R&D effort to solve both the jet blast and weatherability issues that created problems for the first generation beds.

EMAS is now being installed at airports around the country, significantly enhancing the safety of the flying public. EMAS is currently at airports in Minneapolis/St. Paul, MN, Little Rock, AR, Rochester, NY, and Burbank, CA. In 2002 EMAS will be installed at Baton Rouge, LA, New York (JFK), NY, and Binghamton, NY (2 beds). In 2003, EMAS is planned for New York's LaGuardia (1 rebuild and one new), and Little Rock, AK (a second bed). Six additional EMAS are currently under design and FAA review. International interest is also increasing.

Generally, the cost to install an EMAS ranges between $2 million and $4 million, plus site preparation, for U.S. installations. Airports can apply to the FAA for Airport Improvement Program (AIP) grants to help defray the cost of the system.

R&D Field Offices

Pooling Resources

FAA and NASA are pooling their resources to work on joint research efforts that are both efficient and economically beneficial, enhancing the safety of the flying public. The FAA R&D Field Offices at two of NASA's Research Centers are supporting joint FAA/NASA programs and provide coordination on aviation-related NASA work. The FAA Field Offices work closely with NASA personnel by contributing resources directly to established NASA research projects, performing research projects with NASA, and, in cases where NASA research programs have not been defined, acting as principal investigator on mutually agreed upon FAA research utilizing NASA's unique facilities.

The unique relationship between the FAA and NASA dates back to 1971, when the FAA opened its first R&D Field Office at NASA's Ames Research Center in Moffett Field, CA. The FAA established the office to conduct needed research in NASA's specialized facilities in support of developing airworthiness criteria for the supersonic transport aircraft. This ability to pool skills and economic resources reduces duplication of facilities and research efforts.

In 1978, FAA opened its second field office at NASA's Langley Research Center in Hampton, VA. The scope was expanded to include the following: provide technical coordination for numerous joint and cooperative research projects being conducted at the NASA centers; participate in and conduct joint and individual research activities; and identify and facilitate the transfer of significant NASA research and technology to meet the operational needs of the National Airspace System.

Both agencies are benefiting from the numerous collaborative research activities. All of these efforts are made possible under the auspices of various Memorandums of Understandings (MOU) and Memorandums of Agreements (MOA), which establish guidelines for cooperative endeavors and the direction of the research.

There are currently seven active MOU's between the two agencies, focusing research activities on: cockpit/ATC; human factors; airspace system user operational flexibility and productivity; aviation safety research; aviation environmental compatibility; and future space transportations systems. The seventh MOU establishes guidelines for program support activities. Senior management oversight is provided by the FAA/NASA Executive Committee.

The FAA Field Offices at NASA's Ames Research Center and Langley Research Center report directly to the Office of Aviation Research at FAA Headquarters in

Washington, DC. For more information on the FAA Field Offices and the cooperative efforts with NASA, please visit http://faa-www.larc.nasa.gov/index.html

Enhancing Safety and Efficiency Through Applied Research

The purpose of the FAA R&D program is to support FAA's strategic goals and mission, which embody the overarching Department of Transportation (DOT) strategic goals. In so doing, the R&D program collaborates with and supports the entire aviation community in achieving beneficial outcomes for all system users.

The DOT has defined five strategic goals in its Strategic Plan: Safety, Mobility, Economic Growth, Human and Natural Environment, and National Security.

The FAA Strategic Plan outlines goals consistent with the DOT goals.

Safety: By 2007, reduce U.S. aviation fatal accident rates by 80 percent from 1996 levels.

In addition to the reduction in the air carrier accident rate, this goal also has the parallel objective of limiting the number of general aviation fatal accidents to 350 per year by 2007. Increased survivability in air carrier flights is also explicitly identified as an objective. Accident prevention and the analysis and sharing of safety information are key elements of the FAA strategy for this goal, which is a key constituent of the DOT Safety Goal.

System Efficiency: Provide an aerospace transportation system that meets the needs of users and is efficient in the application of FAA and aerospace resources.

The key objectives associated with the System Efficiency goal are to increase the availability to users of national airspace system (NAS) services and facilities and to reduce the costs borne by users of the system and by the federal government in providing the services. Key agency strategies include implementation of Free Flight capabilities, modernization of the NAS, and integration of airport and commercial space requirements into NAS planning and architecture. The System Efficiency goal is supportive of the DOT Mobility, Economic Growth, and Human and Natural Environment strategic goals.

Environment: Prevent, minimize and mitigate environmental impacts, which may represent the single greatest challenge to the continued growth and prosperity of civil aerospace.

Increased understanding of aerospace system environmental impacts, and identification of means to reduce them to acceptable levels are activities central to meeting this goal. Additionally, this goal includes the objective of quantifying and mitigating the environmental impact of FAA activities.

FAA Mission

The FAA mission is to maintain and enhance a safe, secure, and efficient global aerospace system. This mission is derived from FAA's legislative charter and fully supports the DOT and FAA Strategic Plans. Its key elements are to:

- Regulate civil aviation and commercial space transportation to promote safety.

- Enable the safe and efficient use of the aerospace system by civil and military aircraft.

- Promote and facilitate commercial space transportation.

- Provide leadership in planning and developing a safe and efficient national system of airports.

In performing this mission, the FAA (1) establishes safety standards; (2) issues certificates for aircraft and components, airmen, and air operators;
(3) licenses commercial space launches and launch and re-entry sites; (4) monitors safety; (5) provides approximately 600,000 air traffic services daily, and operates, maintains, and modernizes approximately 25,000 subsystems in support of air traffic management; (6) oversees the federal role in the national airport system; and (7) sponsors related research and education to make the aviation and commercial space transportation systems safer, more modern, and efficient.

A solid scientific and technical foundation is required to meet agency goals. Both short- and long-term R&D are necessary to enable ongoing technical and operational innovation and to support informed decision-making in all areas of FAA responsibility. Continued investment in a strong and multi-faceted R&D program is a critical component in meeting the current and future FAA mission in an efficient, timely fashion.

The FAA R&D program is predominantly directed toward specific, near-term needs of FAA's various organizations, such as Regulation and Certification, Airports, and Air Traffic Services. It is largely through the activities of these organizations, and the impact of those R&D activities on the aerospace enterprise, that the FAA goals are achieved.

A comprehensive process is in place for developing a research portfolio in which R&D resources are requested and allocated in accordance with the needs and priorities of each FAA organization.

Activities supported by the R&D program include:

Licensing, Regulation, Certification, and Standards Development for:

--Aircraft
--Air Operators
--Aviation Agencies
--Manufacturers
--Aircrew and other aviation personnel
--Airports
--Commercial Space Transportation
--Security
--Environment

- Modernization, operation, and maintenance of the NAS.
- Aerospace policy formulation, planning, and analysis.
- Effective response to incidents, special situations, and emerging issues.

- Guidance, coordination, and collaboration across the global aerospace transportation community.
- Identification, exploration, and assessment of emerging technological and operational concepts.

The magnitude and complexity of the near and longer-term challenges faced by the aerospace community will require a strong and well-conceived R&D program to develop and validate effective solutions and innovations, whether they involve technology, operational procedures, or regulations.

Thus, it is imperative that the overall program combine critical shorter-term applied R&D with a vigorous and ongoing long-term research program that can define and characterize emerging issues and problem areas, and identify and explore new technologies and concepts. A program of this nature will enable the necessary major innovations in how FAA missions are performed, now and decades in the future, and will expand the knowledge and tools available to the entire aerospace community for advancing safety, efficiency, and environmental compatibility.

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Wake Turbulence Program

Enhancing System Efficiency

The problem of wake turbulence (or wake vortices) has been around as long as flying itself. As a plane moves forward it leaves two trails of air, or vortices, behind it, one under each wing. These invisible, counter-rotating, horizontal mini-tornadoes spin off the tips of each wing, creating a hazard for smaller trailing aircraft. A small airplane caught in the swirling air can be flipped on its back in seconds. And even when the wake vortex is gentle enough to cause an encountering airplane to roll only slightly, it can be disconcerting to the pilot if he is near the ground.

Wake vortices are usually invisible, and pilots often have no warning that they are flying into them. For this reason, the International Civil Aviation Organization (ICAO) has established rules about the spacing between aircraft, based on their sizes. In instrument flying conditions in the U.S., aircraft normally land no closer than 3 nautical miles (5.56 km) behind other aircraft, and a small aircraft must land at least 6 nautical miles (11.12 km) behind a heavy jet.

"Pilots are very accustomed to avoiding hazards they can see," said George Greene, manager of the FAA's NASA Langley Field Office and former manager of the FAA's wake turbulence program, "but since wake vortices are invisible, pilots must visualize where vortices may be, based on the positions of other aircraft and the wind direction." Both pilots and air traffic controllers are well aware of this phenomenon, and do their best to minimize the hazard by maintaining conservative distances between landing aircraft.

Expansion of capacity at some major airports across the nation is severely limited by the aircraft separation standards imposed to avoid encounters with wake turbulence. These separation standards provide time for wake turbulence to move out of the flight corridor or to dissipate or decay over time.

The rate of decay is strongly affected by meteorological conditions. Fortunately, conditions that are conducive for long lasting wakes occur infrequently. Nevertheless, aircraft following too closely behind another aircraft have been known to crash because insufficient time was allowed for the trailing vortices to decay to a benign level. The FAA wants to increase airport capacity by safely decreasing the distance between aircraft during many terminal operations.

Wake turbulence limits the in-trail spacing between aircraft, restricts instrument approaches to closely spaced parallel runways to an equivalent single runway operation, and restricts departure and intersecting runway operations. Solving the wake vortex problem is complex because many of the potential solutions are not practical.

For example, planes might be able to be equipped with sensors for detecting wake turbulence, but the cost of retrofitting entire fleets of aircraft would be high. Furthermore, many of the proposed solutions for the wake vortex problem would only resolve the in-trail part of the problem. The vortices can be blown by wind, and since many runways are parallel, the turbulence can have an adverse effect on landings on adjacent runways. Airports with closely spaced parallel runways routinely use both runways for Visual Meteorological Conditions (VMC) operations.

In Instrument Meteorological Conditions (IMC), closely spaced runways less than 2500 feet apart are operated as a single runway because of wake turbulence constraints. When weather forces marginal VMC or IMC operations, many airports experience congestion, which affects safety and causes costly delays. For example, United Airlines has stated that delays at San Francisco International Airport cost $100 million per year.

Improvements in navigation and surveillance technologies and procedures can safely provide the needed efficiency gains, provided that wake turbulence constraints can be accommodated. There is general agreement that new runways with greater separation are the most effective solution to the capacity problem. However, this may not be feasible due to airport space, cost, or environmental constraints.

To understand how best to meet the capacity challenges created by wake turbulence, the FAA began a formal wake vortex program in FY2002. The foundation for the program was set a couple of years earlier, with a Congressionally mandated research program called Project Socrates. Project Socrates, for Sensor for Optically Characterizing Remote Turbulence Emanating Sound, focused on developing a laser-acoustic sensor for remotely detecting atmospheric hazards.

The initial research under Project Socrates focused on wake hazard and required a ground truth system to determine if the SOCRATES sensor could detect aircraft wakes. As a result, a wake monitoring system using conventional sensors was installed at San Francisco to gather the data required to validate models of wake motion and decay characteristics. The wake data collected at San Francisco are being used to propose new operational wake turbulence procedures and standards.

The Socrates sensor array, as envisioned, consists of several low-powered laser beams located just off the end of the runway under the "short final" segment of an approach. "The technology builds on previously classified U.S. Navy research, which sought ways to locate hostile submarines," according to George Greene. "It was a very risky concept which has not proven practical to date." The goal of the Wake Vortex program is to take all of the research done by FAA, NASA, and other government agencies, and use it to develop cost-effective wake turbulence standards and procedures that are more efficient and safer than existing services and that can be seamlessly inserted into the National Airspace System. Discovering practical solutions is a team effort between the FAA Research, Flight Standards, and Air Traffic organizations. It is this cooperative teaming to find implementable solutions that George Greene is most proud of.

The FAA's Wake Turbulence Research Program is integrated with NASA's wake avoidance technology program and will provide data-driven, procedural enhancements for terminal operations in the near term, while leveraging NASA wake turbulence research in the longer term. FAA's Office of Aviation Research (AAR) recently passed management of the wake vortex program to the agency's Terminal Business Unit (ATB). AAR will continue to provide research support to ATB throughout the remainder of the program. Currently, the majority of wake vortex testing is being done at San Francisco International Airport to support development of more efficient procedures for parallel runway operations. Program officials hope that these new procedures will go mainstream by the fall of 2003. The FY02 budget for the Wake Vortex program is $3.5 million. For more information on the Wake Vortex program, contact George Greene at (757) 864-5545.

Commercial Space Transportation R&D

Preparing for the Future

The commercial space transportation industry is evolving at a rapid pace. The FAA's Associate Administrator for Commercial Space Transportation (AST), Patricia Grace Smith, and her staff have the responsibility for ensuring public safety and protection of property during commercial space transportation operations.

In carrying out this responsibility, AST has developed a number of safety and regulatory initiatives to foster public safety in the U.S. commercial space transportation industry. AST has formed a Research and Development (R&D) Advisory Board to administer this effort.

AST has determined that research and development are essential elements in efforts to lead from a regulatory standpoint. AST's safety, space systems and operations programs will promote the global competitiveness of the U.S. commercial space transportation industry. The AST R&D plan will consist of projects derived from AST requirements.

Each year, AST will identify and select research projects for accomplishment in a timely manner. Selected projects are currently included in the Operations

Appropriations. These projects will further the safety of the U.S. commercial space transportation industry, and make it more efficient and competitive.

AST has previously focused on the following areas:

- Reusable Launch Vehicles (RLV) Operations and Maintenance (O&M): Review Space Shuttle operations and maintenance activities to determine the "best practices" used by the world's only reusable launch vehicle and their applicability to commercial RLV O&M activities.

- Criteria for Determining "Unproven" vs. "Proven" RLVs: Develop criteria to assist in determining when an RLV progresses from an "unproven" to "proven" status.

- Reentry Vehicle Maneuverability and its Effect on Public Safety: Develop criteria to assist in identifying the requirements for RLV reentry maneuverability and its effects on public safety.

- Space and Air Traffic Management System (SATMS): Research the impacts of RLVs on aviation traffic and the safe, seamless integration into the National Airspace System (NAS).

During a recent visit to the FAA William J. Hughes Technical Center, Managers from NASA Kennedy Space Center, the FAA Commercial Space Transportation Office and the Technical Center met to explore research and development areas of common interest. A partnership was formed to embark on the emerging technologies of space transportation. A few areas of interest that the group agreed to pursue included lightning sensors, weather forecasting and modeling space launch/return operations in the NAS. Follow on meetings are planned to explore these and other areas of interest.

Recently FAA/AST entered into a Memorandum of Agreement (MOA) with NASA concerning Commercial Space Transportation Infrastructure Development. This agreement solidifies a greater partnership in developing the nation's future commercial spaceport infrastructure, as well as, addressing the future space and air traffic management system.

The four basic areas of collaboration under the MOA are research, development and demonstration of spaceport and range concepts and technologies; development of requirements and standards for commercial space vehicle systems, launch/ reentry sites and facilities; NASA provided range operations and range safety training to the FAA at Wallops Flight Facility (WFF); and collaboration concerning specific commercial space transportation licensing activities associated with NASA's WFF.

Currently, AST has licensed four commercial spaceports. Three of these facilities are co-located with operating federal facilities. These include California Spaceport, (co-located at Vandenberg AFB); Spaceport Florida, (co-located at Cape Canaveral Air Force Station); and Virginia Space Flight Center, (co-located at Wallops Island). The fourth, Kodiak Launch Complex in Alaska, is the only licensed spaceport that is independent of a federal facility. There is a consortium of states that are proposing to develop spaceports.

AST has three functional divisions:

- AST-100 - the Space Systems Development Division
- AST-200 - the Licensing and Safety Division
- AST-300 - the System Engineering and Training Division

For additional information on FAA's office of the Associate Administrator for Commercial Space Transportation, go to: http://ast.faa.gov/.

Line Operations Safety Audit

Improving Human Performance

Aviation safety and security improvements are dependent on developing a national aviation system that is not only technically sophisticated, but also human performance-based and human-centered. Technology and human factors simply cannot be separated from one another if safety and efficiency are to improve.

Over the past several years, FAA's human factors research scientists have made considerable progress in enhancing system safety through a variety of projects aimed at improving the performance of pilots, crews, controllers, and system maintainers. To better understand flight crew performance, for example, the FAA is funding a University of Texas (UT) research project called the Line Operations Safety Audit (LOSA).

LOSA is a program that uses expert and highly trained observers to collect data about flight crew behavior and situational factors on normal flights. These audits are conducted under strict non-jeopardy conditions; therefore, flight crews are not at risk for observed actions and errors.

The observers record and code potential threats to safety and how the threats are addressed during the flight. Observers also record and code specific behaviors that have been known to be associated with accidents and incidents.

LOSA is linked to Crew Resource Management (CRM) training. Since CRM is essentially error management training for operational personnel, data from LOSA forms the basis for contemporary CRM training re-focus and design. Data from LOSA provides a real-time picture of system operations that can guide organizational strategies in regard to safety, training, and operations.

A particular strength of LOSA is that it identifies examples of superior performance that can be reinforced and used as model for training. The observers also conduct a structured interview to ask pilots for their view of the flight and suggestions to improve safety. These combined data sources provide the airline conducting the LOSA with a diagnostic snapshot of safety strengths and weaknesses in normal flight operations.

This project has observed and evaluated over 4,000 flights at major and regional airlines in the U.S. and around the world. The number of operators joining LOSA constantly increases and includes major international operators from different parts of the world and diverse cultures.

The list of carriers who would like researchers to conduct LOSA is growing rapidly each year and includes both U.S. and foreign carriers. The international acceptance of LOSA has been stimulated by International Civil Aviation Organization's adoption of LOSA as the number one human factors priority through 2004. The ultimate goal of ICAO and the FAA is to give LOSA to the world carriers to implement without the need for research participants.

Dr. Robert Helmreich , the director or the program at The University of Texas, was one of the recipients of the 2001 Aviation Week Laurels Award, presented by Aviation Week & Space Technology. The award, whose honorees are nominated by the magazine's editors, touts individuals and teams who have made significant contributions to the global field of aerospace. Dr. Helmreich and Continental Airlines Capt. Bruce Tesmer were cited "for marrying a new form of crew resource management, called Threat and Error Management, with a novel cockpit monitoring program called [LOSA]."

For more information on LOSA, contact Dr. Eleana Edens at eleana.edens.faa.gov.

The FAA/NASA Joint University Program

Training the Next Generation of Aviation Researchers

The FAA/NASA Joint University Program for Air Transportation Research (JUP) is a long-term cooperative research partnership among three universities to conduct scientific and engineering research. The JUP provides grants to Massachusetts Institute of Technology, Ohio University, and Princeton University to support research covering a broad range of relevant technical disciplines that include human factors, satellite navigation and communications, aircraft flight dynamics, avionics, and meteorological hazards.

Through this program, the universities gain informed comment on their research, as well as proposed new avenues for investigation, via periodic reviews and interactions with FAA and NASA aviation and technical experts. NASA and the FAA leverage their resources, enabling them to achieve better high-priority goals. They benefit directly from the results of specific research projects, and, less formally, from valuable feedback from university researchers regarding the goals and effectiveness of government programs. An additional benefit is the creation of a talented cadre of engineers and scientists who presently form a core of advanced aeronautical expertise in industry, academia, and Government.

Background

In 1971, NASA initiated the JUP on Air Transportation Research. The FAA joined NASA as a sponsor of the program in 1983. It was intended that the research programs be interactive, especially on a student-to-student basis, and that they should build on the particular strengths inherent in the programs at the separate institutions. The goals of this program were consistent with the aeronautical interests of both NASA and FAA in furthering the safety and efficiency of the National Airspace System.

Mike Paglione, FAA JUP Technical Monitor, points out that "since its inception, active programs of education and research at the three universities have provided a strong base on which to build cooperative efforts. Each university submits a separate proposal and is dealt with individually by NASA and FAA. The diversity of interests and capabilities offered by the three universities is an advantage in promoting the broad perspective needed to address a wide variety of air transportation challenges

At the completion of each research task, a comprehensive and detailed report is issued for distribution to other participants in the program. Typically, this is a thesis that fulfills requirements for a graduate degree, or a report describing an undergraduate independent work project. In addition, papers are prepared for technical conferences and archival journals. These not only document work for program participants, they also provide visibility for the JUP with national and international audiences.

Each year, a quarterly program review is held at a NASA or FAA center and at each of the three universities. The most recent review was held at NASA Ames on April 4-5 and the next one is scheduled for June 13-14. At these reviews, research results of the past quarter are presented, and future research plans are discussed. In addition, guest lecturers give presentations on matters of common interest.

Current Research Topics

Princeton University:

- Classical/neural synthesis of nonlinear flight control systems
- Coordinated flight of multiple aircraft
- Aeronautical design and analysis
- Aircraft and airspace security following 9/11

Ohio University:

- Enhanced Head-Up Display for General Aviation Aircraft
- Optimal integration of a Global Positioning System (GPS) and Inertial Navigation System (INS) during aerobatic maneuvering
- High-accuracy GPS navigation and attitude determination
- High-fidelity simulation of GPS receivers
- Communication, Navigation, and Surveillance Security following September 11, 2001

Massachusetts Institute of Technology:

- Surveillance state vector approach to the development of separation standards
- Complexity metrics for air traffic management operations
- Evaluation of capacity issues, public benefits and risks in the modern air transportation system
- Identification of the key issues in the response of the air transportation system to the challenges resulting from the events of September 11

For additional information on the JUP or current research briefings, contact Mike Paglione, FAA JUP Technical Monitor at mike.paglione@faa.tc.gov, or view the JUP website at http://www.act250.tc.faa.gov/jup/index.html.

FAA's Excellence in Aviation Award

Recognizing Our Partners

The FAA's annual Excellence in Aviation award is a highly competitive, non-monetary award that is presented annually to individuals and/or institutions whose past research has benefited the aviation community today. Through this designation, the FAA formally recognizes significant accomplishments as a result of aviation related research efforts.

This special distinction is intended to augment the ability of the government to recognize superior research efforts and to highlight benefits of such activities. Nominees must show significant impact and benefit of extended aviation research efforts and application of improvements within the aviation industry.

This year, 2002, is the fifth year that the agency will be presenting this prestigious award. Each year the nominee pool has grown, reflecting a broad spectrum of aviation-related research activities.

Last year, the FAA selected Dr. Max Shauck of the Baylor University Institute for Air Science as the winner of the 2001 individual FAA Excellence in Aviation award. In announcing his selection, FAA Administrator Jane Garvey said, "For more than three decades, Dr. Shauck has supported the FAA, the aviation community and the nation's aviation goals through his applied aviation research activities and ongoing academic work," said Jane Garvey, FAA administrator. "Working with government, academia, and industry, he has made valuable contributions to discovering alternative fuels for this nation's general aviation fleet."

Working with industry and the FAA, Dr. Shauck is involved in critical environmental research that is helping to reduce harmful emissions through the use of renewable, clean burning aviation fuels. His research has led to the development of environmentally compatible fuels in aviation, certification programs for aircraft using alternative renewable, non-fossil fuels, the use of instrumented aircraft powered by renewable fuels to monitor air pollution, and a university curriculum for the scientist-pilot using aviation studies and flight training to motivate students to a higher level of interest in math and sciences.

Dr. Shauck began test-flying experimental airplanes using ethanol fuel in 1980. In 1989, he and Grazia, his wife, made history when they flew 6000 miles from Waco, TX, to Paris, completing the first transatlantic flight in an aircraft powered by alternative fuel. Two years later, Dr. Shauck received civil aviation's highest honor, the Harmon Trophy.

Dr. Herman Rediess, FAA's Director of Aviation Research, presented the award to Shauck during a ceremony at Baylor's hangar. Rediess remarked that general aviation aircraft will soon be required to move to unleaded fuels, and he acknowledged Shauck for his research into alternative fuel sources, saying, "the FAA is proud to be a research partner with Baylor's Renewable Aviation Fuels Development Center."

Also at the ceremony, Baylor President Robert B. Sloan Jr. announced the establishment of the Baylor Institute for Air Science, which will encompass the department of aviation sciences and the Renewable Aviation Fuels Development Center. Dr. Shauck has been named the chairman of the Institute.

The National Institute for Aviation Research (NIAR) at Wichita State University received the 2001 institutional award for its continued contributions in aviation research and education. NIAR is a core member of the FAA's Centers of Excellence in

Airworthiness Assurance and in General Aviation. NIAR's ability to partner with industry, academia, and government has made it a model for cooperative aviation research in fields such as crashworthiness, composites and advanced materials, structures, aerodynamics, aircraft icing, propulsion, flight control, and human factors.

Other, past recipients of the Excellence in Aviation Award include Dr. Christopher Wickens, University of Illinois Institute of Aviation, who won the 2000 FAA Excellence in Aviation Award. Professor Wicken's leadership as head of the Aviation Research Laboratory at the University of Illinois has lead to significant research in aircraft flight operations, flight training, simulation technology, and aviation education, including theoretical and applied areas. His applied research has lead to changes in heads-up displays (HUD), while his theoretical research has investigated human attention and cognition.

In 1999, the FAA selected Embry-Riddle Aeronautical University to receive the institutional award for its continued contributions in aviation research and education. For more than seven decades, Embry-Riddle has supported the FAA mission and the nation's aviation goals through its applied aviation research activities and ongoing academic programs. Working with both government and industry, the university has made valuable contributions in areas such as air traffic management, aviation human factors, pilot education and training, aircraft maintenance, and airframe design and technology.

The University of North Dakota's John D. Odegard School of Aerospace Sciences received the 1998 institutional award for its over 30 years of innovative aviation research, education and training programs.

Dr. Satya N. Atluri, a professor at the University of California, Los Angeles, received the 1998 individual Excellence in Aviation award for his impact on the aviation research community through his pioneering studies on structural integrity and damage tolerance of commercial and military aircraft, the establishment of widespread fatigue damage thresholds for aircraft, residual strength of aging aircraft with wide-spread fatigue damage, and life-enhancement of aging aircraft structural components through composite patch repairs.

In 1997, the agency selected the Joint University Program (JUP) on Air Transportation Research, a consortium comprising the Massachusetts Institute of Technology, Ohio University, and Princeton University, to receive the agency's first Excellence in Aviation award. That year, the JUP celebrated its 25th year of research, providing both the FAA and NASA a high return on investments. The three universities are conducting cutting-edge research on a variety of aviation topics, such as intelligent flight control systems, weather hazard avoidance, satellite navigation, cockpit displays, and intelligent air traffic management.

For more information on the Excellence in Aviation Award, please contact Terry Kraus via email at terry.kraus@faa.gov.

We want to know . . .

1. Are you a first-time reader of the R&D Review?

2. What did you think of the article “FAA Tests New EMAS Prototype?”

3. How much did you know about the Office of Aviation Research prior to reading this newsletter?

4. What topics would you like to see in future issues of the R&D Review?

5. How often do you visit our website at http://research.faa.gov/aar? How can we improve the website?

6. If you did not receive R&D Review in the mail, would you like to sign up for our distribution list?

Please provide your answers on-line at:
http://research.faa.gov/aar/survey_info.asp